FCC PART 15B/ ICES-003 CLASS B
TEST AND MEASUREMENT REPORT

For

Wi2Wi, Inc.

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San Jose, CA 95131, USA

Model:W2SG0021

Report Type: Original Report		**Product Type:** GPS Module
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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1412035	Original Report	2015-01-21

1 General Information

1.1 Product Description for Equipment under Test (EUT)

This test and measurement report has been compiled on behalf of *Wi2Wi, Inc.* and their product model: *W2SG0021*, which will henceforth be referred to as the "EUT" (Equipment under Test) in this report. The EUT is a GPS Module.

1.2 Mechanical Description of EUT

The EUT measures 91 mm (L) x 80 mm (W) x 14 mm (H) and weights 4 grams.

The data gathered are from a production sample provided by the manufacturer, serial number: 2E80CJ (assigned by BACL)

1.3 Objective

This report is prepared on behalf of *Wi2Wi, Inc.* in accordance with Part 15, Subparts A and B of the Federal Communications Commission rules, and Issue 5 of Industry Canada ICES-003, Interference – Causing Equipment Standards for Digital Apparatus.

The objective is to determine compliance with Part 15 of the FCC Rules and Industry Canada ICES-003 Standard using CISPR 22: 2006 Standard, Class B limits for conducted and radiated emission requirements for Information Technology Equipment.

1.4 Related Submittal(s)/Grant(s)

N/A

1.5 Test Methodology

All measurements contained in this report were conducted in accordance with ANSI C63.4-2009, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All tests were performed at Bay Area Compliance Laboratories Corp.

1.6 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in the field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on CISPR16-4-2:2011, The Treatment of Uncertainty in EMC Measurements, the values ranging from ±2.0 dB for Conducted Emissions tests and ±4.0 dB for Radiated Emissions tests are the most accurate estimates pertaining to uncertainty of EMC measurements at BACL Corp.

1.7 Test Facility

Bay area compliance Laboratories Corp. (BACL) is:
1- An independent Commercial Test Laboratory accredited to **ISO 17025:2005** by **A2LA**, in the fields of: Electromagnetic Compatibility & Telecommunications covering Emissions, Immunity, Radio, RF Exposure, Safety and Telecom. This includes NEBS (Network Equipment Building System), Wireless RF, Telecommunications Terminal Equipment (TTE); Network Equipment; Information Technology Equipment (ITE); Medical Electrical Equipment; Industrial, Commercial, and Medical Test Equipment; Professional Audio and Video Equipment; Electronic (Digital) Products; Industrial and Scientific Instruments; Cabled Distribution Systems and Energy Efficiency Lighting.

2- An ENERGY STAR Recognized Laboratory, for the LM80 Testing, a wide variety of Luminares and Computers.

3- A NIST Designated Phase-I and Phase-II CAB including: ACMA (Australian Communication and Media Authority), BSMI (Bureau of Standards, Metrology and Inspection of Taiwan), IDA (Infocomm Development Authority of Singapore), IC(Industry Canada), Korea (Ministry of Communications Radio Research Laboratory), NCC (Formerly DGT; Directorate General of Telecommunication of Chinese Taipei) OFTA (Office of the Telecommunications Authority of Hong Kong), Vietnam, VCCI - Voluntary Control Council for Interference of Japan and a designated EU CAB (Conformity Assessment Body) (Notified Body) for the EMC and R&TTE Directives.

4- A Product Certification Body accredited to **ISO Guide 65:1996** by **A2LA** to certify:
1- Unlicensed, Licensed radio frequency devices and Telephone Terminal Equipment for the FCC. Scope A1, A2, A3, A4, B1, B2, B3, B4 & C.
2. Radio Standards Specifications (RSS) in the Category I Equipment Standards List and All Broadcasting Technical Standards (BETS) in Category I Equipment Standards List for Industry Canada.
3. Radio Communication Equipment for Singapore.
4. Radio Equipment Specifications, GMDSS Marine Radio Equipment Specifications, and Fixed Network Equipment Specifications for Hong Kong.
5. Japan MIC Telecommunication Business Law (A1, A2) and Radio Law (B1, B2 and B3).
6. Audio/Video, Battery Charging Systems, Computers, Displays, Enterprise Servers, Imaging Equipment, Set-Top Boxes, Telephony, Televisions, Ceiling Fans, CFLs (Including GU24s),Decorative Light Strings, Integral LED Lamps, Luminaires, Residential Ventilating Fans.

The test site used by BACL Corp. to collect radiated and conducted emissions measurement data is located at its facility in Sunnyvale, California, USA.

The test site at BACL Corp. has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997, and Article 8 of the VCCI regulations on December 25, 1997. The test site also complies with the test methods and procedures set forth in CISPR 22:2008 §10.4 for measurements below 1 GHz and §10.6 for measurements above 1 GHz as well as ANSI C63.4-2009, ANSI C63.4-2009, TIA/EIA-603 & CISPR 24:2010.

The Federal Communications Commission and Voluntary Control Council for Interference have the reports on file and they are listed under FCC registration number: 90464 and VCCI Registration No.: A-0027. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL Corp. is an American Association for Laboratory Accreditation (A2LA) accredited laboratory (Lab Code 3297-02). The current scope of accreditations can be found at http://www.a2la.org/scopepdf/3297-02.pdf?CFID=1132286&CFTOKEN=e42a3240dac3f6ba-6DE17DCB-1851-9E57-477422F667031258&jsessionid=8430d44f1f47cf2996124343c704b367816b

2 System Test Configuration

2.1 Justification

The EUT was configured in accordance to ANSI C63.4-2009 Standards.

2.2 EUT Exercise Software

N/A

2.3 BACL EMI Measurement Software

The software used was EMISoft-Vasona 5.0068 for EMI testing.

2.4 Equipment Modifications

N/A

2.5 Special Equipment

N/A

2.6 Mode of Operation

The EUT was in a normal operation mode.

2.7 Method of Monitoring

During the normal operation mode of operation there is an LED mounted on the EUT that indicates if the module is operational.

2.8 Local Support Equipment

Manufacturers	Descriptions	Models	Serial Numbers
Toshiba	Laptop	M55-S3511	N/A

2.9 EUT Internal Configuration Details

N /A

2.10 External I/O Cabling List and Details

Cable Descriptions	Length (m)	From	To
USB cable	0.5	Laptop	EUT

3 Summary of Test Results

FCC & IC Rules	Descriptions of Test	Result(s)
FCC §15.107, IC ICES-003 §6.1	Conducted Emissions	N/A[1]
FCC §15.109, IC ICES-003 §6.2	Radiated Spurious Emissions	Compliant

N/A[1]: EUT is module only.

4 FCC § 15.109 & IC ICES-003 §6.2 – Radiated Emissions

4.1 Applicable Standard

As per FCC §15.109: Radiated Emission Limits

(a) Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency (MHz)	Field Strength (µV/m)
30-88	100
88-216	150
216-960	200
Above 960	500

(g) As an alternative to the radiated emission limits shown in paragraphs (a) and (b) of this section, digital devices may be shown to comply with the standards contained in Third Edition of the International Special Committee on Radio Interference (CISPR), Pub. 22, "Information Technology Equipment—Radio Disturbance Characteristics—Limits and Methods of Measurement."

Note: The CISPR 22 §6 Standard, Class B limits are applied to the test data hereinafter.

As per IC ICES-003 §6.2.1:

An ITE that does not meet the conditions for Class A operation shall comply with the Class B radiated limits set out in Table 5 determined at a distance of 3 meters.

Frequency Range (MHz)	Quasi-peak Limits (dBµV/m)
30-88	40
88-216	43.5
216-960	46
960-1000	54

As per IC ICES-003 §6.2.2: Limits above 1GHz

An ITE that does not meet the conditions for Class A operation shall comply with the Class B radiated limits set out in Table 5 determined at a distance of 3 meters.

Frequency Range (MHz)	Class B Limits (dBµV/m)	
	Average	Peak
>1000	54	74

4.2 Test Setup

The radiated emissions tests were performed in the 10-meter test chamber, using the setup in accordance with ANSI C63.4-2009 measurement procedures. The specifications used were in accordance with CISPR 22 §6 Standard, Class B limits for frequencies between 30 MHz and 1 GHz, and FCC Part 15B, IC ICES-003 Class B limits for frequencies above 1 GHz.

The spacing between the peripherals was 10 cm.

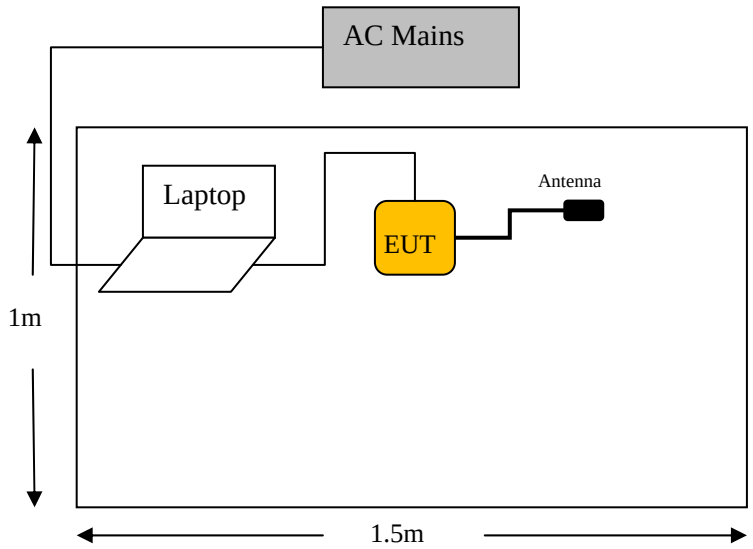
The external I/O cables were draped along the test table and bundled as required.

4.3 Test Procedure

Maximizing procedure was performed on the six (6) highest emissions readings to ensure the EUT is compliant with all installation combinations.

All data was recorded in the peak detection mode. Quasi-peak readings were performed only when an emission was found to be marginal (within -4 dB of specification limits).

4.4 Test Setup Block Diagram



4.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude (CA) is calculated by adding the Antenna Factor (AF), the Cable Loss (CL), the Attenuator Factor (Atten) and subtracting the Amplifier Gain (Ga) to indicated Amplitude (Ai) reading. The basic equation is as follows:

CA = Ai + AF + CL + Atten – Ga

For example, a corrected amplitude of 40.3 dBuV/m = Indicated Reading (32.5 dBuV) + Antenna Factor (+23.5dB) + Cable Loss (3.7 dB) + Attenuator (10 dB) - Amplifier Gain (29.4 dB)

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of -7 dB means the emission is 7 dB below the maximum limit for Class B. The equation for margin calculation is as follows:

Margin = Corrected Amplitude - Class B Limit

4.6 Test Equipment List and Details

Manufacturers	Descriptions	Models	Serial Numbers	Calibration Date	Calibration Interval
Rohde & Schwarz	Receiver, EMI Test	ESCI 1166.5950K03	100044	2014-07-17	1 year
Sunol Sciences	Controller, System	SC104V	113005-1	Cal. Not required	N/A
Keysight Technologies	RF Limiter	11867A	MY42242931	2014-12-17	1 year
Sunol Sciences	Antenna, Biconi-Log	JB1	A020106-1	2014-06-25	1 year
Sunol Sciences	Motor, Tower	TWR95-4	113005-3	Cal. Not required	N/A
Agilent	Amplifier, Pre	8447D	2944A10187	2014-03-20	1 year

Statement of Traceability: **BACL Corp.** attests that all calibrations have been performed according to A2LA requirements, traceable to the NIST.

4.7 Test Environmental Conditions

Temperature:	19º C
Relative Humidity:	54 %
ATM Pressure:	101.8 kPa

The testing was performed by Javier Mandujano from 1-5-2015 in 10 meter chamber 1.

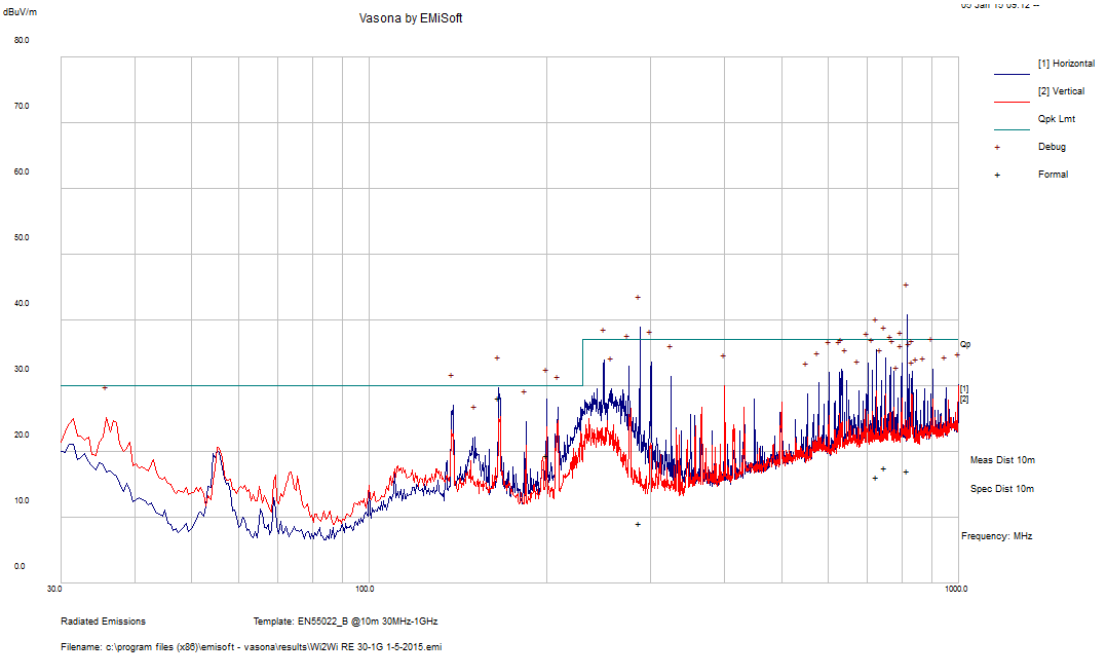
4.8 Summary of Test Results

According to the recorded data, the EUT complied with FCC §15.109 Standard, Class B limits, and had the worst margin reading – when calculated using CISPR 22 §6 Standard, Class B limits – of:

Mode: 30 MHz to 1 GHz			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Range (MHz)**
-1.77	165.9428	Horizontal	30 MHz to 1000 MHz

4.9 Radiated Spurious Emissions Test Plots and Data

30-1000 MHz measured at 10 meters distance



Quasi-Peak Measurements:

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Test Antenna		Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
		Height (cm)	Polarity (H/V)			
165.9428	28.23	400	H	288	30	-1.77
200.0118	19.4	324	H	63	30	-10.6
749.5135	17.49	134	H	66	37	-19.51
818.0958	17.04	145	H	313	37	-19.96
725.2403	16.2	135	H	166	37	-20.8
287.7125	9.11	101	H	302	37	-27.89

5 Exhibit A – FCC & IC Product Labeling Requirements

5.1 Label Information

As per FCC §15.19: Labelling Requirements Paragraph 3

(3) All other devices shall bear the following statement in a conspicuous location on the device:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Specifications: Text is white in color and is left justified. Labels are printed in indelible ink on permanent adhesive backing or silk-screened and shall be affixed at a conspicuous location on the EUT.

As per FCC §15.105: Information to the User

(b) For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

—Reorient or relocate the receiving antenna.

—Increase the separation between the equipment and receiver.

—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

—Consult the dealer or an experienced radio/TV technician for help.

As per IC ICES-003 §8 Labeling Requirements

The manufacturer, importer or supplier shall meet the labeling requirements set out in this section for every ITE unit

- (i) Prior to marketing in Canada, for ITE manufactured in Canada, and;
- (ii) Prior to importation into Canada, for imported ITE.

The presence of the label on the ITE represents the manufacturer's or importer's Self-Declaration of Compliance (SDoC) to Industry Canada ICES-003. Each unit of an ITE model shall bear a label indicating the model's compliance with ICES-003.

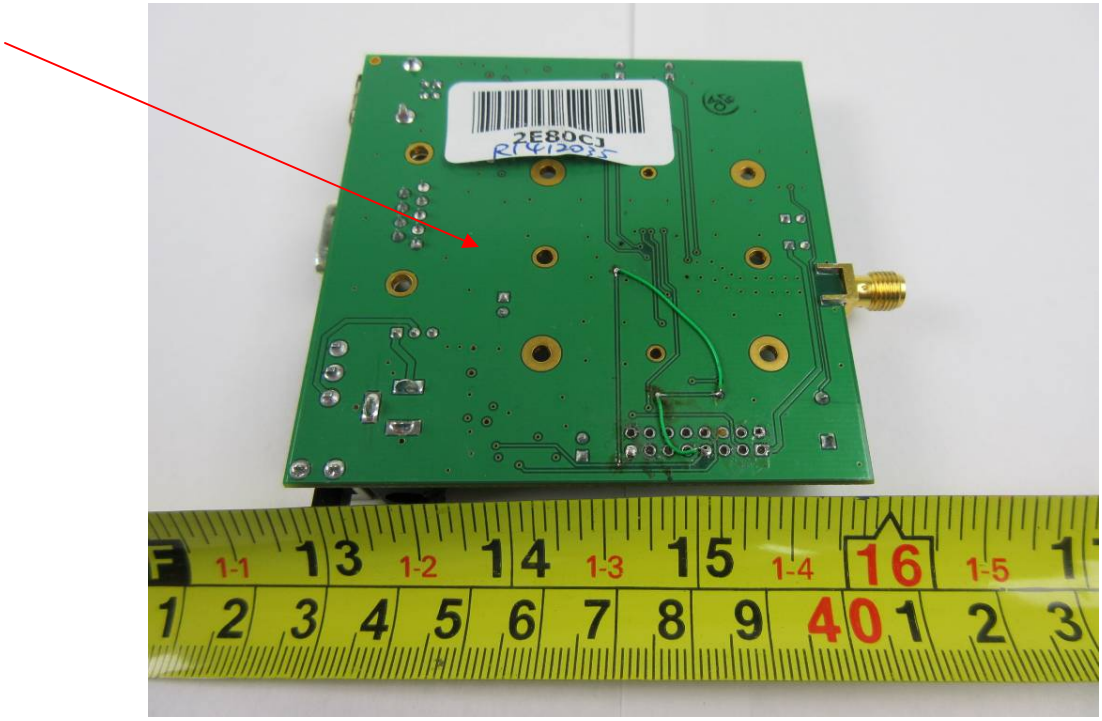
The label shall be permanently affixed to the ITE or displayed electronically and its text must be clearly legible. When the dimension of the device is too small or it is otherwise not practical to place the label on the ITE, the label shall be placed in a prominent location in the user manual supplied with the ITE. The user manual may be in an electronic format and must be readily available.

As per IC ICES-003 Annex

Industry Canada ICES-003 Compliance Label:

CAN ICES-3 (B)/NMB-3(B)

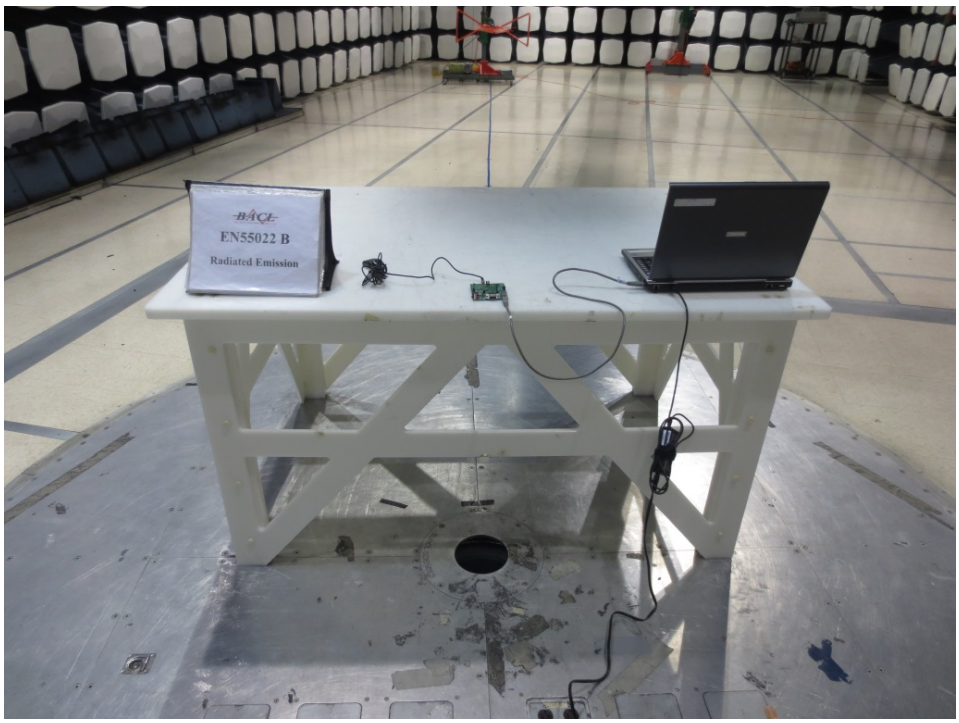
5.2 Suggested Label Location on EUT



6 Exhibit B- Test Setup Photos

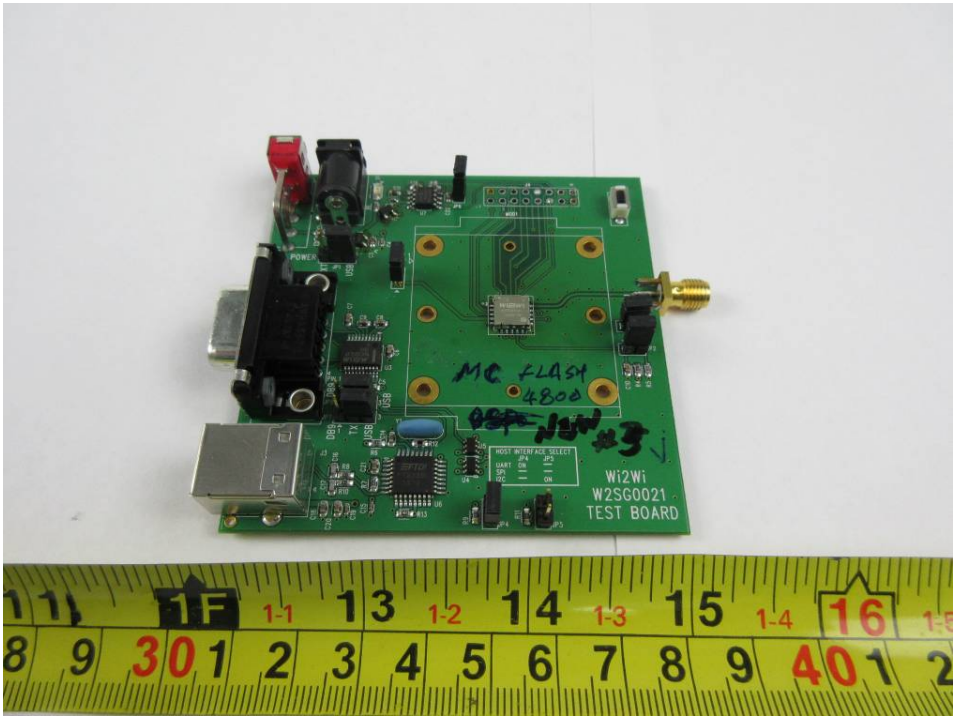
6.1 Radiated Spurious Emissions – Front View

6.2 Radiated Spurious Emissions – Rear View

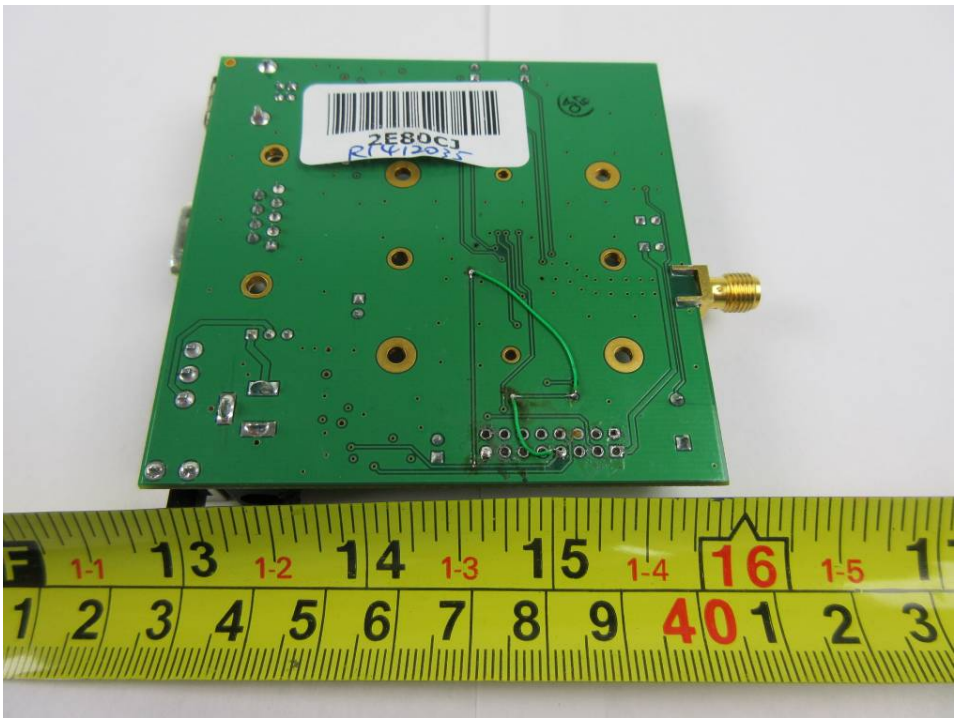


7 Exhibit C- EUT Photos

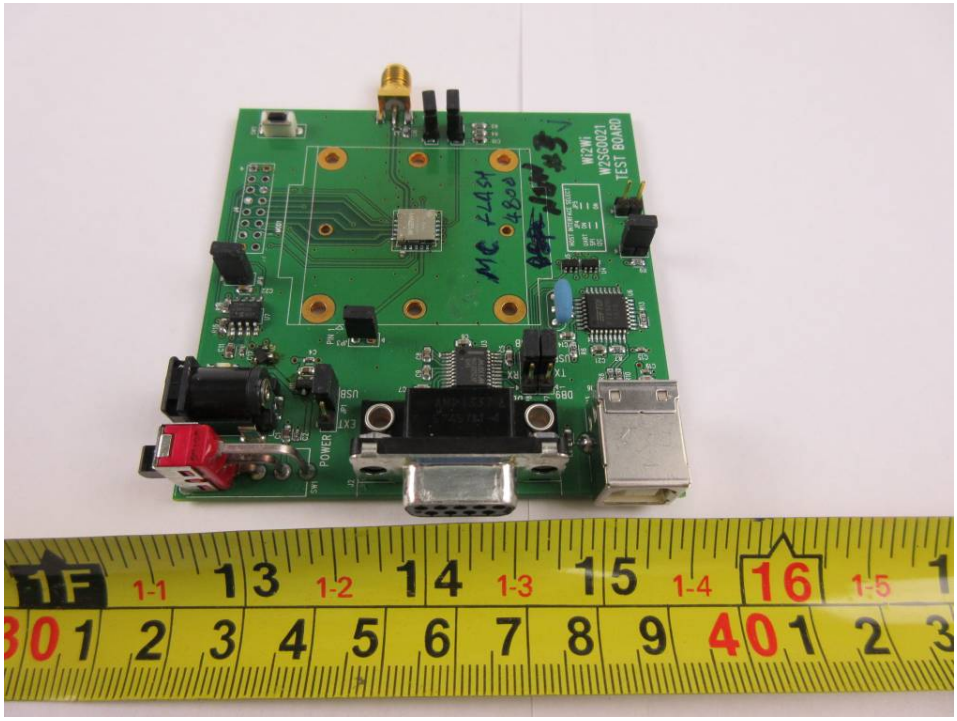
7.1 EUT Host – Front View



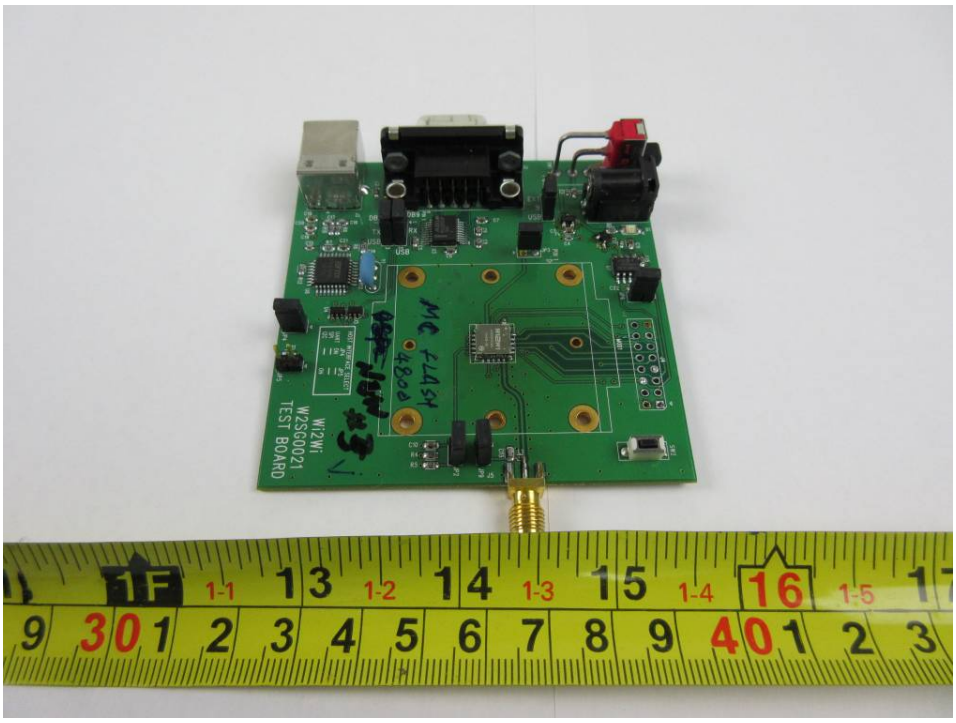
7.2 EUT Host – Back View



7.3 EUT –Left View



7.4 EUT – Right View



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